

# Digital language instruction in Ethiopian high schools: Digital literacy, utilization, and challenges

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## ABSTRACT

The integration of technology in all aspects of learning is crucial for the efficient execution of the teaching and learning process. Technological pedagogical content knowledge (TPACK) signifies the optimal technology integration in the educational domain. In this vein, the present study investigated the level of TPACK among English teachers. The study employed an explanatory sequential mixed methods design, gathering quantitative data from 58 English teachers and qualitative data from 15 English teachers through purposive sampling. Our findings revealed that the teachers exhibited strong content and pedagogical knowledge but needed more technology-related knowledge. Moreover, we found that the teachers did not utilize digital tools to teach English due to challenges like insufficient digital infrastructure, limited digital literacy, and a lack of professional development opportunities. The study also proposes policy reforms and institutional support to overcome these challenges, emphasizing the need for targeted digital literacy training and resource allocation. Several practical implications were discussed for English as a foreign language teachers, institutions, and policymakers. The research findings are valuable; however, it is important to acknowledge the study's limitations in generalizability. These limitations are primarily attributed to the sample size and the specific contextual factors. As a result, there is a need for future research that encompasses a broader range of educational settings in order to enhance the applicability of the findings. The results contribute to understanding how technology integration can be improved in Ethiopian high schools, fostering better educational outcomes.

**Keywords:** digital literacy, digital technology integration, adoption challenges

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## INTRODUCTION

Effective teaching is a multifaceted endeavor beyond merely disseminating information from teacher to student. It involves a comprehensive understanding of the subject matter and the most effective teaching methods to facilitate student learning. To achieve this, teachers must possess deep pedagogical content knowledge (PCK), encompassing subject expertise and effective teaching strategies (Shulman, 1986). Furthermore, in today's digital age, teachers must also be adept at integrating technology into their instructional methods. The ability to leverage technological resources to support PCK is essential for fostering effective teaching and learning outcomes (Welesilassie & Nikolov, 2024a).

Technology is a valuable tool humans have created by combining resources to produce desired products, solve problems, fulfil needs, or satisfy wants. Its importance in advancing human society is undeniable and continues to play an integral role. Information and communication technology (ICT), or hereafter digital technology (tools), a revolutionary impact of technological advancement, has significantly

transformed how we live, communicate, perceive the world, teach, and learn. Accordingly, Mishra and Koehler (2006) advocated for the inclusion of technological knowledge (TK) as a third knowledge base in the PCK framework of Shulman (1986), ultimately giving rise to the technological pedagogical content knowledge (TPACK) framework. TPACK is a framework developed to address issues related to teachers' competencies in using technology in classrooms and describe the knowledge required for intelligent pedagogical uses of technology.

Technology integration in educational environments has gained increasing importance, as evidenced by recent research underscoring the significance of teacher readiness and willingness to embrace digital resources. Kalogiannakis and Papadakis (2017) demonstrated the positive reception of 'ScratchJr' among pre-service kindergarten teachers to promote computational thinking, indicating that even at the early stages of education, digital tools can significantly influence learning outcomes. Furthermore, studies have indicated that incorporating educational robotics and similar resources may face obstacles such as teacher apprehension and insufficient support systems (Papadakis et al., 2021). These insights underscore the necessity of professional development and institutional backing to cultivate

favorable attitudes and effective technology implementation among educators.

Due to the pressing need to incorporate digital technology in education, coupled with limited exposure to natural English-speaking environments and few opportunities for real-time communication with native English speakers, the Ethiopian government has been taking steps to train teachers and provide modern digital equipment to educational institutions (Welesilassie & Nikolov, 2024b). The Ministry of Education of the Federal Democratic Republic of Ethiopia fully understands the importance of incorporating digital technology to make academic content more accessible (Yigezu, 2021). This can be seen in the education and training roadmap-2030 as well as the general education quality improvement package (GEQIP), which both emphasize the use of e-learning, digital textbooks, and online courses in schools and teacher training programs (Ministry of Education [MOE], 2008, 2021).

Regardless of the positive initiative and the growing body of evidence on the benefits of using ICT in schools, effective ICT integration into teaching requires addressing several key factors (Welesilassie & Nikolov, 2024b). Firstly, the availability of ICT tools, such as computers, tablets, software, and reliable internet access, is fundamental, as these tools serve as the foundation for technology-driven educational approaches. Secondly, teachers' ICT literacy is paramount; educators must possess the digital skills and competence to navigate ICT tools, troubleshoot issues, and adapt technology to support diverse teaching scenarios. Thirdly, effective utilization of ICT involves not only having access to technology but also knowing how to integrate it meaningfully into lessons, aligning technology use with educational objectives, and designing engaging activities that enhance student understanding and engagement. Lastly, institutional support plays a vital role, with academic institutions needing to provide teachers with training, resources, and a supportive environment for ICT integration, as well as establish policies and guidelines that encourage responsible and effective ICT use in education (Yigezu, 2021). Only when these prerequisites are met can ICT be applied to teaching effectively and contribute positively to the educational process.

The study's objective was to investigate teachers' TPACK proficiency levels, classroom integration practices, and factors that could have affected the integration of digital tools in Ethiopian high schools. This investigation can significantly benefit teachers, students, policymakers, and the existing literature. Firstly, it enables teachers to identify gaps in their knowledge and skills related to integrating technology into language teaching, which can be addressed through targeted professional development, ultimately improving their instructional practices. Students also benefit from increased access to technology-enhanced learning experiences, which can enhance their engagement, motivation, and overall language acquisition skills. Secondly, policymakers can make informed decisions regarding allocating resources and developing policies that support the effective integration of ICT in language education, thus ensuring that students are well-equipped for the digital age.

This research holds great significance as it addresses the pressing need to enhance the integration of digital tools in high school English instruction in Ethiopia. Despite technological advancements, there is still underutilization. By examining teachers' TPACK competencies and identifying the challenges they encounter, this study offers valuable insights for improving teacher training, policy development, and

allocation of resources. The findings can potentially guide national and local education authorities in creating a more inclusive education system that effectively incorporates digital tools, thus leading to better outcomes in English language teaching and learning. Finally, the findings contribute to the literature by providing empirical evidence and insights into the relationships between ICT availability, teachers' TPACK knowledge, and classroom practices, which can inform future research and guide the development of effective educational strategies in Ethiopia and beyond.

## REVIEW OF THE LITERATURE

The literature review for this study involved an exploratory review to gain a comprehensive understanding of the TPACK framework and its applications in educational settings, specifically in the context of English as a foreign language (EFL) teaching. We identified relevant studies through academic databases such as Scopus, Web of Science, Google Scholar, ERIC, and JSTOR, focusing on peer-reviewed journal articles and books published in the last two decades. Our selection criteria were based on relevance to TPACK, digital literacy, and technology integration in education. We prioritized studies that directly addressed these themes or provided insights into similar educational contexts for inclusion.

### Digital Technology in Ethiopian Schools

Education is critical to societal progress and economic development, and the Ethiopian government fully acknowledges this fact. To improve the quality of public services and ultimately enhance the lives of citizens, the Ethiopian government has undertaken a bold ICT-enabled transformation in all sectors, including education. However, technology adoption in the country's education sector has been slow due to its unique context. The significant challenges facing Ethiopia's education sector include access, relevance, equity, and quality (MOE, 2017). Ethiopia's progress is significantly impeded by limited exposure to English-speaking environments, digital illiteracy, and a lack of quality digital tools for education. The country's rank of 179 out of 193 in the 2022 index of UN e-government development indicates a lack of significant technological advancement.

Integrating digital technology is essential to enhance education accessibility and quality (Yigezu, 2021). The government is dedicated to leveraging digital technology, especially in teacher training, to ensure the availability of ICT across all school levels, thus improving learning and teaching capabilities (MOE, 2008, 2021). The Ministry of Education of the Federal Democratic Republic of Ethiopia has conducted an education sector development plan (ESDP) for the last twenty-five years to achieve the objectives, philosophy, vision, values, and goals of the education and training roadmap-2030. By implementing all the previous ESDP-1 to ESDP-5, tremendous achievements have been registered in access to education and coverage. However, a more extended mile remains regarding education quality and equity. The current ESDP-6 2020/21-2024/25 is designed to vigorously address the gaps of the previous EDSPs (Yigezu, 2021).

One of the six programs outlined in ESDP-6 2020/21-2024/25 is program 6, which focuses on leveraging digital technology, such as e-learning and online courses, to improve educational accessibility. The program aims to create a more efficient education system by transforming education management, teaching, and assessment

(Yigezu, 2021). Additionally, it seeks to equip students with digital skills to enhance their learning experience. The program comprises fundamental components and sub-components that aim to harness the power of digital technology in various facets of education (MOE, 2021). The first component focuses on utilizing digital technology for assessment and examination, underscoring the significance of creating platforms for online learning outcomes assessment and national examinations. The second component emphasizes the importance of digital technology for online training of teachers and school leaders, addressing the need for practical digital skills in teaching and administration. The third component includes data learning, processing, and management technologies in the education sector, which include acquiring school information, collecting data on students' daily schooling, managing the school inspection system, and handling general education statistics. Lastly, component 4 aims to establish digital-intensive secondary schools, emphasizing the significance of ICT infrastructure, capacity building for technology use, digital content development, and digital learning to ensure inclusive access to education. These components aim to enrich education by strategically integrating digital technology (MOE, 2021).

Moreover, the awareness of the Federal Democratic Republic of Ethiopia on the benefits of ICT for pedagogy is not in doubt, as evident in the GEQIP, which is a more specific program implemented within the education sector to improve the quality of general education in Ethiopia (MOE, 2008). The GEQIP is a World Bank-approved initiative to enhance Ethiopia's quality, internal efficiency, and equitable access to general education. Currently active in the Eastern and Southern Africa region, the project is being implemented by the Ministry of Education and focuses on specific pre-primary, primary, and secondary education activities. One of the fundamental objectives of GEQIP is to integrate ICT into general education to enhance the overall educational experience and provide students with access to cutting-edge tools and resources. With technology, the program seeks to bridge the digital divide and empower students and teachers to excel academically. Overall, GEQIP is a vital project that has the potential to transform the education sector in Ethiopia and create a brighter future for the country's youth.

### Theoretical Framework

Teachers must have coherent and differentiated knowledge to create the best learning experience for their students. Possessing specific skills is what distinguishes them as true professionals. Traditionally, teachers have been trained to maintain two types of knowledge: content knowledge (CK), which pertains to the subject matter being taught, and pedagogical knowledge (PK), which refers to the methods and strategies used to teach that subject matter. However, this approach treats the two types of knowledge as mutually exclusive, which does not accurately represent teaching (Shulman, 1986). Shulman (1986) criticized teacher education programs for failing to recognize that teaching requires a combination of both CK and PK. Shulman (1986) introduced a new type of knowledge base called PCK. PCK refers to understanding how specific topics, issues, or problems are organized, presented, and adapted to meet learners' diverse interests and abilities for instruction. This concept is an essential component of effective teaching, as it involves a deep understanding of the subject matter and how to teach it to engage and support student learning (Shulman, 1986).

According to Koehler and Mishra (2009), the PCK framework was introduced in the mid-1980s, when educational technology was not as widespread as today. They suggest that the framework has become increasingly relevant as the number and variety of educational technology tools and resources have grown. The PCK concept mainly focuses on how pedagogy and content are related in teaching. However, as digital educational technologies have become more prevalent in academic settings, educators have realized that effective teaching requires understanding PCK and integrating technology with pedagogy and content (Mishra & Koehler, 2006). Accordingly, Mishra and Koehler (2006) proposed a valuable addition to Shulman's (1986) PCK framework—including TK as a third knowledge base. This innovative approach paved the way for developing the TPACK framework, elucidating the interdependence between content, pedagogical, and TK. The TPACK model has been widely acknowledged as the first comprehensive and unifying conceptual framework in educational technology (Mishra & Koehler, 2006). TPACK, extensively researched and widely popular in the 21<sup>st</sup> century, serves as a theoretical framework for understanding the competencies teachers need for efficient technology integration in the classroom. It encapsulates the essential knowledge, skills, and attitudes for effective teaching with technology.

The TPACK framework is composed of three main knowledge components: CK, PK, and TK. The intersections of these components are represented as PCK, technological content knowledge (TCK), technological pedagogical knowledge (TPK), and TPACK (Mishra & Koehler, 2006).

**CK:** In the TPACK framework, CK refers to the subject matter teachers need to know, including English language communicative and linguistic competency. Sound CK is crucial for teachers to prevent transferring deficient or incorrect knowledge to students. To achieve this, teachers must stay open to changes in their field and closely follow frameworks that organize ideas related to their field (Koehler & Mishra, 2009).

**PK** refers to a teacher's understanding of teaching and learning methods. A skilled teacher possessing exceptional PK can effectively design lessons, expertly manage a classroom, precisely assess students' learning, and adeptly adapt their teaching techniques to match the needs of their specific group of learners (Mishra & Koehler, 2006).

**TK** refers to understanding traditional and modern technologies and their practical application in various aspects of daily life and academic settings. As technology evolves rapidly, educators need support and guidance to stay informed and current on the latest advancements (Mishra & Koehler, 2006).

**PCK** is a critical aspect of TPACK, involving interpreting subject matter, transforming it into different representations, and customizing teaching materials (Koehler & Mishra, 2009; Mishra & Koehler, 2006). In EFL TPACK, PCK relies heavily on SLA theories to transform the subject matter into teachable representations. A teacher with PCK can design and implement the content matter to be taught.

**TCK** is a critical concept that refers to the intersection of technology and content, exploring how they affect each other. TCK is concerned with understanding the constraints and affordances technology creates to represent different types of content. In the context of EFL TPACK, TCK refers to a teacher's expertise in utilizing technology to teach linguistic and communicative knowledge and the opportunities technology can provide for language learning (Mishra &

Koehler, 2006). However, developing this knowledge requires more than just familiarity with the content areas to be taught. It also involves teaching that content via technology, which may not always be easy (Koehler & Mishra, 2009; Mishra & Koehler, 2006).

**TPK** refers to a teacher's understanding of how technology can be used and how it can affect the teaching and learning process. TPK involves identifying how specific technologies can enhance or limit the teacher's pedagogical choices and how the teacher can choose the best technologies to fit their teaching style (Mishra & Koehler, 2006). A high level of TPK can help teachers make informed decisions about integrating technology into their teaching practices.

The **TPACK** model is centered around equipping teachers with the necessary knowledge and skills to integrate technology seamlessly into their teaching. This model emphasizes the importance of TK, PK, and CK. By recognizing how these components intersect and influence each other, teachers with TPACK possess the expertise to make informed decisions about incorporating technology to enhance teaching and learning experiences (Koehler & Mishra, 2009; Mishra & Koehler, 2006). Ultimately, this leads to a more meaningful technological integration into the curriculum. The definition suggests that TPACK is more than just the sum of its parts. It allows teachers to find a harmonious balance between the content they teach, their pedagogical strategies, and the educational technologies they employ. As the importance of tech integration in the classroom has grown, so has the significance of TPACK for teachers. As a result, teacher education programs have become a crucial site for implementing the TPACK framework.

### **TPACK: Empirical Studies, Criticism, and Validation**

Technology integration in education has been a topic of great interest for a considerable period. However, despite the growing interest, an established theoretical framework was lacking to guide educators in effectively incorporating technology into their teaching practices. The concept of TPACK was developed to address this issue. TPACK is a relatively new concept in educational research, but scholars and practitioners have widely recognized its significance. Since its inception, TPACK has undergone extensive study, critique, and validation to determine its effectiveness in enhancing teaching and learning outcomes.

Studies on TPACK have explored various aspects of the concept, such as the development of TPACK among pre-service teachers, the impact of TPACK on teacher professional development, and the use of TPACK as a framework for designing technology-enhanced learning environments. For example, to measure the TPACK level of pre-service EFL teachers, Sarıçoban et al. (2019) found that pre-service EFL teachers viewed themselves as sufficient in almost all TPACK sub-dimensions based on their self-evaluation. According to a study conducted by Shi and Jiang (2022) in universities across China, EFL teachers exhibited greater confidence in their PK, CK, and PCK knowledge areas but less so in TK. The study also found that contextual factors, knowledge of students, demographic background, and access to quality training impacted teachers' technological applications and TPACK development. Similarly, according to Ali and Mohammadzadeh's (2022) findings, teachers in the Kurdistan Region of Iraq were generally better equipped with pedagogical and subject matter knowledge than TK. The study revealed that while teachers scored higher in the PK and CK domains, their mean scores for technology-related knowledge, such as TK, TPK, TCK, and TPACK,

were comparatively lower. However, Koşar's (2023) research on university educators in Turkey found that the TK component of TPACK had the highest average value, indicating that the teachers had a significant amount of TK. Conversely, the CK component had the lowest average value, suggesting that the participants lacked sufficient CK.

Numerous recent studies have investigated the impediments to adopting digital tools in educational environments, in parallel with the challenges outlined in the present study. For instance, Karakose et al. (2023) employed structural equation modelling to appraise the impact of factors such as classroom management anxiety and academic self-efficacy on the attitudes of prospective educators towards the teaching profession, subsequently influencing their inclination to embrace new technologies. Similarly, Papadakis et al. (2021) scrutinized the reluctance of in-service teachers to incorporate educational robotics into their instructional methodologies, emphasizing the necessity for tailored training and institutional backing to surmount these obstacles. These investigations underscore the imperative of addressing technological proficiency and the underlying psychological and structural determinants that can impact technology integration in educational settings.

Demissie et al. (2022) evaluated digital competencies and technology integration in Ethiopian secondary school teachers. The study revealed that teachers had high confidence in their CK, PK, and PCK competencies but were less confident about their TK and TPACK competencies. Demissie et al. (2022) found that students in Ethiopia lack access to digital infrastructure, including stable internet, computers, smartphones, and online learning platforms. According to Ferede et al. (2022), institutional characteristics such as the vision and plan for ICT use, provision of professional development opportunities, management, and technical support, along with individual factors such as instructors' ICT competence and attitude and students' ICT competence and access to infrastructure, play a crucial role in determining the extent of ICT use in higher education institutions in Ethiopia. Additionally, infrastructure-related factors such as internet connectivity, availability of ICT equipment, access to electricity, and optimal classroom setup were identified as critical determinants for effective ICT integration in the higher education landscape of Ethiopia. Hunduma and Mekuria (2023) also found that integrating digital tools in Ethiopian public secondary schools is hindered by a lack of infrastructure, funds, technical and administrative support, time, and teachers' knowledge and abilities.

Critiques of the concept have focused on issues such as the lack of clear definitions of TPACK components, the potential overlap between TPACK and other related concepts, and the challenge of measuring TPACK. For instance, scholars such as Archambault and Barnett (2010), Cox and Graham (2009), Lee and Tsai (2010), and Angeli and Valanides (2009) have criticized TPACK. They argue that defining and differentiating knowledge types is complex and that the framework lacks clarity. Quantitative methods used in TPACK research raise concerns about reliability and validity. Critics note that TPACK's teacher-centered perspective overlooks institutional support, curriculum design, student engagement, and social, cultural, and ethical dimensions in technology integration (Koehler et al., 2014; Willermark, 2018).

Numerous studies have been conducted to assess the effectiveness of TPACK in improving teaching and learning outcomes. These



investigations have provided compelling proof of the beneficial influence of TPACK on teacher pedagogical practices, student academic performance, and technology integration into the curriculum (Koehler et al., 2012). For instance, Schmidt et al. (2009) developed a survey tool to evaluate TPACK among preservice teachers, which was later validated with 124 participants. The results indicated the reliability and validity of the instrument and its potential for longitudinal TPACK assessment. Similarly, in the Iranian EFL context, Bagheri (2020) validated the TPACK instrument, which revealed that teachers recognized six out of seven TPACK constructs but did not perceive TCK as an independent factor. Baser et al. (2016) developed and validated TPACK for EFL preservice teachers, establishing a consistent seven-factor structure. Bostancıoğlu and Handley (2018) also created and validated TPACK using a six-factor solution, including PCK, TK, CK, TPK, TCK, and TPCK, based on international expert evaluations and exploratory and confirmatory factor analyses.

In conclusion, the TPACK framework has been widely recognized as a valuable tool for understanding the complex interplay between technology, pedagogy, and CK in educational contexts. However, there have been inconsistencies in the findings of empirical studies, which highlights the need for further research to refine and enhance the model. One of the primary challenges in using the TPACK framework is the lack of clear definitions for its components and their overlapping nature, making it difficult to assess and measure effectively. According to a study by Koehler and Mishra (2009), this lack of clarity and consistency has led to challenges in developing valid and reliable measures of TPACK. To address this ambiguity, researchers should employ a combination of quantitative and qualitative methods to gain a comprehensive understanding of each TPACK component and its interactions. As Creswell (2012) noted, a mixed-methods approach can help researchers better understand a research problem by combining quantitative and qualitative data collection and analysis methods.

Moreover, the literature highlights the recurring issue of inadequate institutional support for TPACK integration, which impedes its practical implementation in educational settings. According to a study by Schmidt et al. (2009), lack of institutional support can lead to teacher resistance and hinder the successful integration of TPACK into classroom practice. Therefore, it is imperative to emphasize the importance of institutional support and collaboration in facilitating the adoption and implementation of TPACK initiatives. Incorporating institutional support mechanisms, such as professional development programs, funding allocation, and policy frameworks, can foster a conducive environment for studying and implementing TPACK effectively. Archambault et al. (2010) noted that such support mechanisms can help overcome barriers to TPACK integration and create a culture of innovation and collaboration in educational institutions.

### The Study

The present study aimed to fill the research gap in the reviewed literature. Specifically, we aimed to investigate the TPACK competency of high school teachers in Ethiopia using a mixed-method research design. To ensure we comprehensively understand the topic, we included additional variables such as classroom integration practices and factors affecting the integration process. By including these variables, we hope to gather more reliable information that will enable us to make more informed conclusions about the TPACK competency

of Ethiopian high school teachers. The study addressed the following research questions.

1. What is the level of TPACK knowledge among Ethiopian high school teachers?
2. To what extent do teachers incorporate digital tools into their English language instruction?
3. What obstacles hinder teachers' attempts to incorporate digital tools into English instruction?

## METHODOLOGY

### Design

The current research utilized an explanatory sequential mixed methods design to comprehensively explore the quantitative and qualitative dimensions of teachers' TPACK and their utilization of digital tools (Creswell, 2012). This mixed-methods approach facilitated a holistic understanding of the research inquiry, with quantitative data revealing overarching trends and qualitative data delivering nuanced insights into teachers' experiences.

Data was gathered from 58 English teachers through a structured questionnaire to evaluate their TPACK proficiency. The questionnaire covered CK, PK, TK, and the intersections of these domains. Additionally, qualitative data was obtained from semi-structured interviews with 15 teachers to explore their perspectives and difficulties concerning integrating digital tools in the classroom.

We analyzed quantitative data using descriptive statistics to ascertain teachers' proficiency levels in different TPACK domains. We examined qualitative data through thematic analysis, enabling us to identify key themes related to teachers' challenges and beliefs about technology use in education. By combining these methods, we ensured a comprehensive understanding of the issue, resulting in robust and applicable findings.

The selection of a mixed-methods approach was deliberate as it resonates with the research's aims of comprehensively grasping the level of teachers' TPACK proficiency and elucidating the root causes behind their restricted utilization of digital tools. The quantitative analysis furnished discernible trends within a broader subject pool, while the qualitative analysis contextualized these observations by delving into the individual experiences and obstacles encountered by educators. This methodological choice ensures that the research is descriptive and explanatory, yielding valuable insights for informing policy development and guiding teacher training initiatives.

### Setting and Participants

The research was carried out during the first semester of the 2024 academic year at Axum Secondary School in Northern Ethiopia's Tigray Regional State. In total, 72 English teachers taught in the four high schools in Aksum Woreda. Of these teachers, 53 were male, while 19 were female. Purposive sampling was used to include all willing teachers to ensure that there were all the data points.

### Instruments of Data Collection

The research utilized two distinct data-gathering tools: questionnaires and semi-structured interviews. A rigorous content validation process was undertaken to validate the questionnaire (Creswell, 2012; Dörnyei & Taguchi, 2009). The questionnaire was

derived from established instruments in previous TPACK studies (Koehler & Mishra, 2009; Mishra & Koehler, 2006; Shi & Jiang, 2022). It underwent expert reviews to assess its relevance and clarity. Multiple experienced EFL teachers and educational researchers were consulted to ensure that the items accurately measured the intended constructs. Subsequently, a pilot test was conducted with a small group of teachers, and revisions were implemented to enhance the questionnaire's clarity and accuracy. The questionnaire was divided into three parts: background information, TPACK proficiency items (CK, PK, TK, PCK, TCK, TPK, and TPACK), and digital tools integration practices.

1. **CK:** This group had five items that measured knowledge related to the subject content with Cronbach's alpha of .79.
2. **PK:** This category comprised six items that measured a teacher's comprehension of diverse teaching and learning approaches. Cronbach's alpha was .68.
3. **PCK:** This category comprises seven items measuring teachers' knowledge of transforming subject matter into teachable representations. Cronbach's alpha was .74.
4. **TK:** This set of seven items assessed teachers' knowledge of traditional and modern technologies frequently used in daily life and academic environments. The measurement scale's reliability was high, as evidenced by its Cronbach's alpha coefficient of .73.
5. **TCK:** This group of four items measures teachers' ability to use technology effectively to teach the English language. Cronbach's alpha was .88.
6. **TPK:** This set of six items assessed a teacher's comprehension of how specific technologies can support or constrain their teaching methods. Cronbach's alpha was .72.
7. **TPACK:** This category consisted of five items measuring teachers' knowledge and skills to integrate technology effectively into their teaching practices, ensuring that technology is used meaningfully and purposefully to enhance student learning. Cronbach's alpha value was .81.
8. **Digital tools integration practices:** This category comprised 14 items that measured the extent to which digital tools were integrated into teaching and learning practices. Cronbach's alpha was .71.

To augment the quantitative findings and address the fifth research question, semi-structured interviews were conducted with 15 high school teachers. The focal point of these interviews was to shed light on the challenges that teachers face while integrating digital tools into their lessons, their beliefs about digital technology and education, the support provided by their respective schools, the availability and accessibility of digital tools, and their suggestions for improving digital integration in education. The primary objective of these interviews was to provide a comprehensive understanding of the experiences and perspectives of high school teachers regarding digital integration, thereby enhancing the depth and breadth of the research.

### The Procedure of Data Collection and Analysis

After receiving approval from the Institutional Review Board in the first semester of the 2022 academic year, the second author informed potential participants about the study's purpose, steps, benefits, and risks. Only teachers with written consent were invited to respond to the survey. Using pencil-and-paper questionnaires, participants rated their

level of agreement or disagreement with statements on a six-point Likert scale, ranging from "strongly disagree" to "strongly agree." It took them approximately 30 minutes to complete the questionnaire. We used IBM SPSS 25 and reported descriptive statistics to analyze the quantitative data. We selected a random sample of 15 teachers to share their experiences to gather qualitative data. We answered six open-ended interview questions about their use of digital tools and any obstacles they encountered during the integration process. The interviews were conducted at the teachers' convenience during school hours and lasted approximately 15 minutes each. We then organized, transcribed, and analyzed the data by hand. As Creswell (2012) described, this method involves reading the data, marking it by hand, and dividing it into parts. For our study, manual analysis was preferred over computer analysis because the database was relatively small (less than 500 pages of transcripts), and we wanted a hands-on approach to the data. The data was then objectively and systematically condensed into multi-level categories, including primary and subcategories. Ultimately, we grouped our findings into significant themes and provided detailed narrative discussions and interpretations.

### Validation

In the first phase of the research, the researchers worked together to compile various materials for the study. These materials were sourced from validated instruments utilized in prior studies. The researchers conducted a rigorous content review in the subsequent phase to establish content validity. This critical step ensured that the study's content aligned with the research objective. The final phase involved assessing the items' reliability to confirm the consistency and accuracy of results, providing the study's findings were trustworthy (Tseng et al., 2020).

## RESULTS AND DISCUSSIONS

This study examined EFL teachers' TPACK proficiency, integration practices, and potential factors influencing the integration process. The subsequent section primarily illustrates the obtained results and their critical analysis by juxtaposing them with previous findings. This critical discussion is crucial in contextualizing the present study within the broader academic discourse and advancing knowledge in the respective field.

### RQ1. What Is the Level of TPACK Knowledge Among Ethiopian EFL Teachers?

In this section, we discuss the TPACK knowledge domains in detail. We present a critical analysis of each domain in separate tables. **Table 1** focuses on the teachers' CK.

As displayed in **Table 1**, EFL teachers in Ethiopia had a strong command of the subject matter (mean  $[M] = 5.09$ , standard deviation  $[SD] = .80$ ). According to Koehler and Mishra's (2009) model, CK is a vital element of an EFL teacher's knowledge base. It encompasses various aspects, such as communicative and linguistic competence in English. In line with this, Ethiopian EFL teachers believed they possessed a robust CK, which includes language proficiency covering the four primary skills of listening, speaking, reading, and writing, as well as micro skills like vocabulary, grammar, pronunciation, and cultural understanding. Furthermore, they were confident and competent in using the language frequently. Demissie et al. (2022) and Sarıçoban et al. (2019) found that teachers possessed a high level of

**Table 1.** Descriptive analysis of teachers' CK

CK	Min.	Max.	M	SD
I am confident in mastering the subject matter necessary to teach English successfully.	2.00	6.00	5.03	1.16
I stay updated about the most recent advancements in English language content.	2.00	6.00	5.13	1.09
I'm comfortable answering challenging questions about English language content with proper spelling, grammar, and punctuation.	3.00	6.00	5.13	1.04
I can easily articulate my thoughts and emotions verbally and in written form using English.	1.00	6.00	5.01	1.21
I can easily read and understand spoken English.	2.00	6.00	5.13	1.17
Sum	3.40	6.00	5.09	0.80

**Table 2.** Descriptive analysis of teachers' PK

PK	Min.	Max.	M	SD
I am acquainted with diverse pedagogical approaches.	3.00	6.00	5.06	0.98
I excel in crafting comprehensive lesson plans that accommodate various learning styles.	3.00	6.00	4.95	1.08
I can tailor my teaching approach to accommodate the varying needs of my students.	3.00	6.00	5.15	0.93
I can efficiently handle classroom activities to foster a conducive learning atmosphere.	2.00	6.00	4.80	1.32
I can evaluate my students' progress and give them helpful feedback for improvement.	1.00	6.00	5.20	1.31
I possess expertise in contemporary English teaching theories and practices.	1.00	6.00	4.68	1.35
Sum	3.17	6.00	4.97	0.72

**Table 3.** Descriptive analysis of teachers' PCK

PCK	Min.	Max.	M	SD
I can successfully link English content to real-life situations.	1.00	6.00	4.26	1.27
I can teach English based on student needs.	1.00	6.00	4.18	1.35
I can design English language exercises that facilitate the practical application of learned concepts for students.	1.00	6.00	4.25	1.37
I can design captivating lesson plans that align with the English curriculum's goals.	1.00	6.00	4.16	1.45
I can differentiate instruction for learners of varying abilities.	1.00	6.00	5.03	1.52
I can set learning goals and assess students' understanding of English language material.	2.00	6.00	4.90	1.21
I understand the link between English language content and efficient teaching methodologies.	2.00	6.00	4.88	1.13
Sum	2.43	6.00	4.52	0.83

confidence in their CK competencies, which aligns with the results presented here.

Based on the statistical analysis presented in **Table 2**, it was discovered that the teachers possess the necessary pedagogical skills to carry out effective teaching practices ( $M = 4.97$ ,  $SD = .72$ ). According to Shulman (1986), EFL teachers' PK involves understanding principles, teaching strategies, methods, classroom management, educational contexts, learners, learning, and student assessment. Koehler and Mishra (2009) stress their significance in providing compelling language learning experiences. The study highlighted that high school teachers in Ethiopia possess the essential pedagogical expertise required for effective teaching practices. These competencies included a thorough understanding of various teaching methods, the ability to adapt to changing teaching styles, the aptitude for selecting appropriate teaching materials, and the ability to assess students' learning outcomes. Furthermore, the teaching approaches adopted by these educators were grounded in theoretical principles explicitly developed for EFL teachers.

As displayed in **Table 3**, the PCK of the teachers was also found to be high ( $M = 4.52$ ,  $SD = .83$ ). The concept of PCK developed by Koehler and Mishra (2009), is a theoretical framework that explains how teachers combine their knowledge of content with their understanding of teaching strategies. It is a dynamic and complex combination of knowledge essential for effective teaching. The study results indicated that teachers in Ethiopia firmly understood the fundamental aspects of education, such as creating a conducive learning environment, developing curricula, assessing student progress, and providing feedback. These factors contributed to effective learning (Koehler & Mishra, 2009). Furthermore, the teachers could tailor their teaching

techniques to effectively address the different macro and micro language skills that students need to acquire. They showed flexibility in their pedagogical approaches to ensure students received a well-rounded education addressing all aspects of language learning. To put it simply, these educators were well-versed in utilizing their expertise to develop lessons that were both captivating and impactful. They understood how to make the subject matter relatable, engaging, and practical to maximize student learning. According to the research conducted by Demissie et al. (2022) and Shi and Jiang (2022), teachers have a significantly high level of confidence in their CK competencies. This aligns with the results presented in the current study, which suggests that teachers possess a strong sense of self-assurance regarding their CK competencies.

**Table 4** revealed that teachers exhibited a limited level of TK ( $M = 2.6$ ,  $SD = .61$ ). Demissie et al.'s (2022) and Shi and Jiang's (2022) findings aligned with this result, revealing a significant lack of TK among teachers. However, this result contrasted with Koşar's (2023) research, which showed that Turkish teachers had high technological proficiency. The findings underscored a lack of familiarity among teachers across various technologies, including essential tools such as internet browsing, Microsoft Office programs (i.e., Word, PowerPoint, etc.), updating and troubleshooting skills, multimedia integration, digital classroom equipment operation, electronic dictionaries, online learning platforms, mobile applications, engagement with social networks, use of specialized software and websites, as well as ethics in using technology.

According to the findings displayed in **Table 5**, EFL teachers needed a comprehensive understanding of TCK ( $M = 2.34$ ,  $SD = 1.01$ ). This study aligned with the research conducted by Ali and

**Table 4.** Descriptive analysis of teachers' TK

TK	Min.	Max.	M	SD
I am well-versed in diverse digital tools and resources for teaching and learning English.	1.00	6.00	2.63	1.27
I stay up to date with digital technology trends for English language education.	1.00	4.00	2.48	0.85
I actively seek opportunities to improve my digital teaching skills.	1.00	4.00	2.73	0.86
I can resolve basic technical problems related to digital tools and devices.	1.00	4.00	2.43	0.99
I understand digital citizenship and the importance of ethical technology use.	1.00	5.00	3.10	1.24
I am familiar with operating digital classroom equipment.	1.00	4.00	2.51	0.87
I can efficiently browse the internet to gather English teaching materials.	1.00	4.00	2.58	0.76
Sum	1.00	4.00	2.6	0.61

**Table 5.** Descriptive analysis of teachers' TCK

TCK	Min.	Max.	M	SD
I possess a firm grasp of the technological tools relevant to teaching the subject matter.	1.00	5.00	2.18	1.04
I can use technology to provide additional resources to improve English proficiency.	1.00	4.00	2.08	0.90
I am proficient in leveraging technology to enhance various aspects of language skills.	1.00	6.00	2.68	1.42
I can generate digital content that improves the comprehension of English subjects.	1.00	5.00	2.41	1.25
Sum	1.00	4.00	2.34	1.01

**Table 6.** Descriptive analysis of teachers' TPK

TPK	Min.	Max.	M	SD
I can integrate technology to achieve targeted learning outcomes in my English classes.	1.00	5.00	2.40	0.96
I use technology to personalize instruction for each student.	1.00	4.00	2.60	0.88
I can modify my teaching methods to suit the available technology.	1.00	5.00	2.68	0.87
I excel at designing tech-infused educational materials.	1.00	6.00	2.60	0.84
I can teach students about the proper and legal use of technology, including ethics, safety, and copyright.	1.00	4.00	2.68	0.87
I can manage a technology-enhanced classroom learning environment.	2.00	4.00	2.71	0.73
Sum	1.83	4.00	2.61	0.56

Mohammadzadeh (2022), which highlighted a significant lack of TCK among teachers in the Kurdistan Region of Iraq. TCK refers to understanding which specific technologies are best suited to address subject-matter learning in their respective domains and how the content can influence the technology or vice versa Koehler and Mishra (2009). This means that the content and technology are interdependent and can affect each other differently. As Koehler and Mishra (2009) put forward, having TCK is crucial for educators as it allows them to choose the most appropriate technology for their subject area and tailor it to meet the unique needs of their students. The study revealed that these teachers do not believe they integrate multiple forms of technology to teach essential skills such as listening, speaking, reading, and writing, including micro-skills such as vocabulary, grammar, pronunciation, and cultural understanding. The apparent lack of confidence among the teachers in their ability to effectively use technology further highlights their inadequate level of TK and experience, which may impede their ability to select appropriate methods and strategies for teaching different language skills.

**Table 6** showed that the teachers' TPK was not up to the mark ( $M = 2.61$ ,  $SD = .56$ ). This study aligned with the findings of Demissie et al. (2022), which unveiled significant deficiencies in TPK among teachers in Ethiopia. TPK refers to the ability to identify how specific technologies can either enhance or limit the pedagogical choices of the teacher and how to choose the best technology that suits their teaching style (Mishra & Koehler, 2006). As per the research, Ethiopian teachers needed to learn to integrate specific technologies to improve, change or adapt the teaching and learning processes. Additionally, they needed more knowledge about the legal use of technology, including ethics, safety, and copyright.

According to **Table 7**, it has come to notice that teachers in Ethiopia lack TPACK skills ( $M = 2.76$ ,  $SD = .82$ ). This notion, which pertains to using technology in effective teaching, entails a profound understanding of conceptual representation through technology and the implementation of technology-based pedagogical methods to teach content (Koehler & Mishra, 2009). However, these teachers needed to gain the skills to represent concepts using technology and apply pedagogical techniques that utilized technology effectively to teach content. This suggested that these teachers did not have the necessary understanding and skills to use technology to represent concepts and apply technology-based pedagogical techniques to teach the content effectively. Several factors could have contributed to this result, including TK and the technological and pedagogical aspects that conditioned TPACK.

To sum up, Ethiopian teachers were found to have a mixed TPACK proficiency. Ethiopian teachers were found to have strong CK, PK, and PCK; however, they needed more technology-related knowledge, including TK, TCK, TPK, and TPACK. The present study corroborates the findings of several earlier investigations carried out across diverse regions, including China by Shi and Jiang (2022), the Kurdistan Region of Iraq by Ali and Mohammadzadeh (2022), and Ethiopia by Demissie et al. (2022). These studies revealed that teachers exhibit higher confidence levels in their PK, CK, and PCK but comparatively lower confidence levels in their TK. However, it is pertinent to note that our findings do not align with Koşar's (2023) research on university educators in Turkey, which reported high levels of TK but a lower level of CK among teachers. While possessing sufficient CK, PK, and PCK is essential for effectively adopting technology to facilitate teaching (Koehler & Mishra, 2009; Mishra & Koehler, 2006), many Ethiopian teachers, despite having adequate PCK, reportedly lack the perceived



**Table 7.** Descriptive analysis of teachers' TPACK

TPACK	Min.	Max.	M	SD
I can align technology with teaching to create engaging learning experiences that enhance understanding of subject-specific content.	1.00	5.00	3.06	1.17
I can design and implement engaging English lessons by combining technology, pedagogy, and content knowledge.	1.00	5.00	2.80	1.14
I can select appropriate technological solutions that supplement the teaching process, enrich the learning experience, and augment the curriculum.	1.00	5.00	2.75	1.14
I can blend technology and traditional teaching methods to optimize the English learning experience.	1.00	4.00	2.86	1.01
I can modify my use of technology in English instruction based on specific content, pedagogical objectives, and my students' diverse needs and preferences.	1.00	4.00	2.35	0.93
Sum	1.00	4.00	2.76	0.82

**Table 8.** Descriptive analysis of teachers' practices of integrating digital technology tools in their lesson

Digital technology tools	Min.	Max.	M	SD
I use online language courses to help students learn languages effectively through structured materials, lessons, and assessments.	1.00	4.00	2.20	0.79
I integrate language learning apps with interactive features like exercises, lessons, practice, and games.	1.00	4.00	2.16	0.80
I use LLS with speech recognition, interactive exercises, multimedia content, and progress tracking to create an interactive learning environment.	1.00	5.00	2.20	0.95
I employ VR and AR technologies to provide immersive language learning experiences in authentic contexts.	1.00	4.00	2.43	0.98
I connect students with online language tutors for personalized instruction, conversation practice, and tailored feedback to support their language learning needs.	1.00	4.00	2.31	0.96
I use ILL to help students improve their language skills through engaging activities.	1.00	4.00	2.50	1.09
I offer access to language learning websites that provide resources such as lessons, exercises, tutorials, and forums to support learning outside the classroom.	1.00	4.00	2.36	0.82
I connect students with social media or language communities for cultural exchange and practice.	1.00	4.00	1.86	0.87
I use various online resources such as textbooks, audio recordings, videos, and interactive exercises to accommodate different learning styles.	1.00	4.00	1.83	0.78
I incorporate enjoyable and engaging games to facilitate language learning.	1.00	4.00	1.90	0.81
I use online language assessment tools to evaluate proficiency and provide feedback on language skills efficiently.	1.00	5.00	2.80	1.17
I use AI-powered LLAs for language practice, feedback, and support.	1.00	4.00	2.50	1.09
I incorporate multimedia resources encompassing text, audio, images, and video to create a rich and engaging language learning experience.	1.00	5.00	2.90	1.08
I use DLPs to track language learning progress and skills, encouraging self-reflection and assessment.	1.00	4.00	2.66	1.00
Sum	1.43	3.57	2.33	0.43

know-how and pedagogy to integrate technology efficiently into their instruction.

### RQ2. To What Extent Do Teachers Incorporate Digital Tools Into Their English Language Instruction?

The second research question deals with teachers' actual classroom technology integration practices. **Table 8** shows that the extent to which English language learning digital tools are integrated into their instruction is almost negligible ( $M = 2.33$ ,  $SD = .43$ ).

As per the findings presented in **Table 8**, it is evident that the utilization of digital technology tools by teachers in their pedagogical practices was observed to be significantly low ( $M = 2.33$ ,  $SD = .43$ ). When asked to rate the specific digital tools they used, teachers reported that they had yet to utilize any language learning apps, websites, software, or language labs in their classes. Additionally, they needed to incorporate online language learning resources like social media and AI assistants or multimedia resources like text, audio, images, and video. They have yet to use virtual reality (VR) and augmented reality (AR) technologies. Suppose digital tools need to be correctly integrated into language teaching. In that case, participants may not be adequately prepared to use technology in their future academic or professional pursuits, harming their language learning outcomes (Archambault & Barnett, 2010; Baser et al., 2016; Koehler & Mishra, 2009; Schmidt et al., 2009).

### RQ3. What Obstacles Hinder Teachers' Attempts to Incorporate ICT Into English Instruction?

During the interviews with teachers, it was found that several challenges hinder their ability to incorporate digital tools into English lessons. These difficulties can be grouped into three broad categories: first, a lack of infrastructure and resources, such as inconsistent power supply, unreliable internet connections, and inadequate hardware and software. Second, capacity building and professional development include the absence of regular ICT training, insufficient digital knowledge and skills, and teachers' beliefs about online digital tools. Third, policy and governance involve a lack of funding and budget allocation, the absence of clear ICT policy guidelines, language barriers, localization of digital resources, and teacher workload and time constraints.

#### Lack of Infrastructure and Resources

##### *Fluctuating power supply*

In Ethiopia, high schools often face the challenge of fluctuating power supply, which leads to frequent power outages that significantly disrupt the use of digital tools and instructional activities. The issue of inconsistent power supply in Ethiopian high schools considerably impacts the use and integration of ICT in the classroom. When electricity is unreliable, teachers cannot depend on digital tools such as computers, projectors, or other electronic gadgets for teaching and learning. This can result in missed opportunities for students to engage with technology and impede their ability to acquire crucial digital skills. ICT in the classroom can augment learning outcomes and prepare

students for the digital world. However, the lack of a dependable power supply poses a significant challenge to integrating technology into education. One of the school's teachers explained that power outages occur frequently, disrupting lessons and making it challenging to use digital tools effectively.

"Power outages are prevalent at our school. It interrupts lectures and hinders digital tool usage" (T1).

#### **Poor internet connection**

In Ethiopian high schools, the availability and reliability of internet connectivity are limited. As a result, students and teachers face significant challenges in accessing online resources, educational websites, and collaborative platforms that can enhance their learning experience. The lack of reliable internet connectivity hampers teachers' ability to incorporate digital tools and resources that require internet access into their instruction. This can negatively impact students' academic performance and limit their exposure to the latest learning technologies and online resources. A teacher explained the internet disruption that occurred at the school:

"Using technology in our lessons is difficult because we do not have enough computers or software, and we do not have a specific area for digital learning" (T3).

#### **Insufficient technological devices and resources**

According to the study, secondary schools were found to have a complete unavailability of various technological devices and resources. These included PCs, smartphones, LCD projectors, laptops, printers, and plasma TV and radio; language learning software (LLS), apps, websites, games, interactive language labs (ILL), artificial intelligence (AI)-powered language learning assistants (LLAs); multimedia resources; digital language portfolios (DLPs), and online language courses were utterly unavailable. English language learning is an essential part of education in Ethiopia. Ethiopian students only learn English in the classroom and have no exposure to English speakers outside of it. However, with the rise of technology in education, relying solely on classroom instruction can limit students' access to diverse learning materials and interactive platforms. Without access to these tools, students may struggle to develop their language skills, which can harm the quality of education they receive and long-term implications on their academic and professional success (Mishra & Koehler, 2006). This is consistent with Demissie et al. (2022) and Hunduma and Mekuria (2023), who revealed that Ethiopian students lack access to digital infrastructure, including stable internet, computers, smartphones, and online learning platforms.

"We often cannot integrate technology into our lessons due to limited computers, smartphones, software, and space for digital learning" (T3).

The present study highlights a lack of infrastructure and resources available to educators. These findings align with previous research conducted by Demissie et al. (2022) in the Ethiopian context, which found that educators in Ethiopia face significant barriers to accessing digital infrastructure, such as stable internet connections, computers, smartphones, and online learning platforms. This lack of resources can harm educators and students, hindering their ability to engage in digital learning and teaching activities effectively.

## **Digital Literacy and Perception Barriers**

### ***Insufficient digital knowledge and skills***

Insufficient proficiency in using digital tools by teachers and students is a significant obstacle to successfully integrating technology into teaching. As a result, teachers and students may find it challenging to navigate digital platforms and efficiently utilize digital resources effectively. In one teacher's words, using technology in instruction can be a struggle without adequate digital literacy skills.

"I do not have the necessary digital skills, which affects the integration of technology in the lesson. I did not receive any professional development about digital integration" (T4).

The findings indicate that ongoing professional development centered on digital literacy and technology integration is crucial for addressing the challenges identified. Similar to the conclusions drawn by Kalogiannakis and Papadakis (2017), who illustrated how the adoption of computational tools like 'ScratchJr' among pre-service teachers increased following specific training, our study underscores the importance of continuous, practical training initiatives to enhance teachers' digital competencies and self-assurance.

### ***Beliefs about online digital tools***

Many Ethiopian high school teachers have unrealistic perceptions and beliefs about the potential of online digital tools in education. They often view such tools as being designed primarily for entertainment and sharing information rather than for sharing knowledge and educational resources. As a result, these teachers may be hesitant to incorporate online digital tools into their instruction despite the many benefits such tools can offer. One teacher shared his experience of doubting the usefulness of online digital tools in education.

"I am not entirely sure about the importance of online digital tools for educational purposes. I use my mobile phone to entertain myself and get information through Facebook, Telegram, Instagram, TikTok, and YouTube. I believe these platforms are meant for entertainment rather than educational purposes" (T9).

Our study revealed that Ethiopian high school teachers encountered substantial difficulties when integrating digital resources, primarily attributable to their limited technological proficiency and infrastructure. These obstacles were exacerbated by educators' apprehension and uncertainty surrounding incorporating technology into their teaching practices. This aligns with the research of Karakose et al. (2023), which demonstrated the significant impact of classroom management anxiety and self-efficacy beliefs on prospective teachers' attitudes toward technology adoption. Therefore, it was imperative to address these psychological barriers to cultivate a conducive environment for the effective integration of technology.

As highlighted in the present study, the absence of adequate capacity building and professional development opportunities aligns with previous findings reported by Ferede et al. (2022) in the Ethiopian and Shi and Jiang (2022) in the Chinese context. Their research revealed that several institutional characteristics, such as the existence of a clear vision and plan for technology integration, provision of professional development opportunities, effective management and technical support, in addition to individual characteristics, such as instructors' ICT competence and attitude, and students' ICT competence and access

to infrastructure, were among the prominent challenges faced by teachers in their endeavors to incorporate digital tools into their pedagogical practices.

## **Policy and Governance**

### ***Insufficient funding and budget allocation***

Limited financial resources allocated for ICT integration in Ethiopian high schools can pose a significant challenge for schools regarding infrastructure development, teacher training, and procurement of digital resources. Integrating digital tools in high schools requires considerable investment in money and time (Papadakis et al., 2021). Schools may struggle to acquire the resources needed to support digital tool integration without adequate funding. This, in turn, could lead to a lack of access to quality digital resources and limited opportunities for students to develop the digital skills required for success in today's world. One teacher made this statement.

“We often lack funding for technology integration, hindering our ability to use digital tools in the classroom effectively” (T5).

### ***Absence of clear ICT policy guidelines***

The absence of a coherent ICT policy framework and application guidelines at national and regional levels has created a sense of ambiguity and inconsistency in integrating ICT across high schools in Ethiopia. The lack of clear guidelines has resulted in a shortage of direction and support for schools in implementing effective ICT strategies, hindering efforts towards meaningful ICT integration. Consequently, many high schools struggle to develop and implement comprehensive ICT policies that can help them leverage technology's power to improve the education system. A teacher explained it, as follows:

“I believe that clear guidelines and policies regarding ICT integration are lacking at the national, regional, and even school level, making it difficult to effectively incorporate technology into teaching practices” (T6).

Similar challenges were identified by Papadakis et al. (2021), who found that in-service teachers struggled to incorporate educational robotics into their practice due to a lack of institutional support and clear guidelines. Our study reinforces the importance of establishing robust policy frameworks and resource allocations to effectively support teachers in adopting new technologies.

### ***Language barriers and localization of digital resources***

A significant challenge facing Ethiopian high schools is the limited availability of digital resources tailored to local languages and cultural contexts. This lack of localized digital resources hinders relevance and accessibility, as teachers may struggle to find materials that resonate with students' diverse cultural backgrounds. A teacher provided an explanation which can be summarized, as follows:

“The scarcity of digital resources customized to our local languages and cultural contexts poses a challenge in finding materials that connect with our students' backgrounds and interests” (T10).

### ***Teacher workload and time constraints***

Teachers' high workload and time constraints in Ethiopian high schools have hindered their professional development and experimentation with digital tools. Teachers in these schools spend more than 35 hours per week in teaching activities, leaving them with limited time and resources for training and planning. This has made it difficult for them to integrate digital tools into their already demanding schedules. The lack of dedicated time for training and planning has negatively impacted education quality, as teachers cannot keep up with the latest teaching methodologies and technologies. A teacher explained this, as follows:

“Our workload limits experimentation with digital tools, hindering our ability to meet students' changing needs in the digital age” (T7).

### ***Lack of school support***

We asked teachers to reflect on the level of support they receive from their school when integrating digital tools into their teaching. We followed up with questions about whether the school provides regular opportunities for professional development, modern digital tools, and expert guidance. We also explored whether the school's curriculum allows for integrating digital tools and whether teachers are rewarded for their efforts in this area. All the 15 teachers disagreed with all of the statements. One teacher provided the following explanation of this:

“I have never received any training in using digital tools for teaching throughout my career, which makes me feel unprepared to integrate technology into my lessons” (T6).

The Ethiopian teachers expressed discontent with the school's endeavors to provide continuous professional development courses regarding digital tools. The teachers perceived these efforts to be inadequate or entirely non-existent. Furthermore, the school's provision of modern digital tools and access to experts to assist teachers in integrating technology into their teaching practices was suboptimal. The existing curriculum was not conducive to effectively integrating digital tools into teaching plans, which created additional challenges for teachers. Lastly, teachers felt undervalued and inadequately recognized for their efforts to incorporate digital tools into their teaching practices, leading to frustration and demotivation. This lack of support and recognition of teachers' efforts to integrate technology into their teaching practices significantly hinders the development of a technologically competent workforce. In today's fast-paced and technology-driven world, educators must have access to modern digital tools and continuous professional development programs to keep up with the changing educational landscape (Koehler & Mishra, 2009; Sariçoban et al., 2019; Shi & Jiang, 2022). Teachers must be adequately equipped with the skills and knowledge necessary to integrate technology into their teaching practices successfully. Providing access to experts who can assist with integrating technology into the classroom can also help teachers overcome any challenges they may face (Koehler & Mishra, 2009).

In summary, the study found that lack of infrastructure, insufficient funds, and technical, administrative, and policy support hinder the integration of ICT in education. This was consistent with the results reported by Ferede et al. (2022) in the Ethiopian context. The study by Ferede et al. found that institutional characteristics such as the vision

and plan for ICT use and management and technical support posed significant challenges for teachers who attempted to integrate digital tools into their lessons.

## CONCLUSION AND IMPLICATIONS

The study analyzed the availability of digital tools to EFL teachers, their competence in using such tools, and the level of support they received from their institutions to integrate them into their teaching. The study also explored teachers' challenges in incorporating digital tools into their lessons and the factors influencing their decision-making. The findings of this study have several implications for EFL teachers, institutions, and policymakers.

The research indicated that Ethiopian teachers demonstrated strong content and PK but lacked technology-related knowledge. Continuous professional development programs should be implemented to address this gap and improve their technological proficiency. Additionally, policymakers can mandate technology integration into teacher training programs, and administrators can conduct in-house training sessions to enhance teachers' technological competence.

To enhance teachers' technological expertise, professional development initiatives should prioritize the practical implementation of TPACK through interactive workshops that bolster digital proficiency and problem-solving abilities and incorporate digital resources in English language teaching. Integrating the TPACK framework into training sessions will assist educators in aligning technology with instructional methods and subject matter. Furthermore, establishing mentorship programs and cultivating online communities of practice can offer continuous support, while structured follow-up evaluations will guarantee continual advancement in technology integration.

Next, the study revealed that teachers do not use digital language learning tools. The limited integration of digital tools is mainly due to inadequate infrastructure and insufficient digital literacy. Overcoming these challenges requires specific policy reforms and institutional support. Educational policymakers must prioritize allocating resources to improve digital infrastructure in schools, including providing reliable internet access and modern technological tools. Additionally, institutions should implement ongoing professional development programs focused on enhancing digital literacy among teachers. Encouraging schools to adopt digital technologies and providing grants for technology upgrades through supportive policies can further help bridge the gap in digital tool integration. A collaborative approach between government bodies and educational institutions is necessary to establish a sustainable, technology-enhanced learning environment.

Finally, the study identified various obstacles to incorporating digital tools into English lessons, such as insufficient digital infrastructure, a shortage of educational resources, inadequate professional development, and challenging policies and governance. This inadequacy challenges teachers and students to acquire English language proficiency inside and outside the classroom, thus hindering their academic and professional progress. To address this issue, teachers must demonstrate resilience, innovation, and a proactive attitude towards self-improvement and advocacy. It is recommended that teachers take advantage of all available resources for ICT-based language teaching. Meanwhile, school administrators should support

ICT adoption by facilitating infrastructure improvements, continuous professional development, and a conducive learning environment. It would benefit the school by collaborating with the neighboring community, non-governmental organizations, and other funding sources to provide it with contemporary digital tools. Providing expert guidance and implementing a rewards program for teachers dedicated to incorporating digital tools into their teaching could also be helpful. Furthermore, policymakers should introduce policies to facilitate funding and the provision of necessary technological devices and digital learning platforms to schools, thereby creating an engaging and effective language learning environment. By doing so, it will be possible to enhance the quality of education students receive and ensure they are well-prepared for the challenges of the 21<sup>st</sup> century.

In conclusion, this research offers valuable insights into the challenges of integrating digital tools in Ethiopian high schools, particularly by underscoring the TK gaps among teachers and the limited utilization of digital tools. It significantly contributes to the field by providing specific recommendations for teacher training and policy reform, crucial for enhancing digital literacy and infrastructure in low-resource settings. Nevertheless, the study's small sample size and reliance on self-reported data may impact its generalizability. Future research should aim to broaden the sample size and incorporate more objective measures. In summary, this study addresses a gap in the literature by focusing on a developing country context, laying the groundwork for advancing technology integration in global education.

### Limitations and Future Research Direction

Although informative, the study had a limited scope, restricting its generalizability. Thus, forthcoming research should involve participants from various regions to increase its applicability. While the current methodology used descriptive statistics to examine teachers' TPACK proficiency level, future studies could use structural equation modelling to explore the causal relationships between TPACK and factors like achievement, motivation, anxiety, self-efficacy, age, gender, and work experience. Furthermore, the present study focused on secondary school teachers, leaving a gap in understanding the situation in elementary schools. Future studies must focus on elementary school teachers to obtain a more comprehensive view of the educational landscape. The study may have been limited by potential self-reporting biases due to the reliance on teachers' responses. Future research could incorporate observations or third-party assessments to measure ICT usage and proficiency objectively. Furthermore, the research did not consider potential cultural and contextual factors that may have influenced ICT integration in teaching, which could have resulted in further limitations. Future studies should consider these unique cultural, socio-economic, and educational contexts. Lastly, given the rapid evolution of technologies, the study's findings may be subject to the effects of technological change over time. Therefore, continuous research is necessary to stay current with the progress and trends in ICT and its application in education.

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process, systematically curating and organizing the datasets to facilitate robust analysis. Berhane ensured the data's consistency and integrity while also engaging in the review and editing of the manuscript, thereby enhancing its clarity and coherence. Both authors demonstrated their dedication to the research by diligently reviewing and approving the final manuscript before submission. This shared commitment underscores the integrity and quality of the research. Both authors approved the final version of the article.

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